

CLAIMS

What is claimed is:

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1. A method for speculatively reusing regions of code, the method
2 comprising:
3 identifying a reuse region and a data input to the reuse region;
4 determining whether a data output of the reuse region is contained within
5 reuse region instance information pertaining to a plurality of instances of the
6 reuse region; and
7 when the data output is not contained within the reuse region instance
8 information, predicting the data output of the reuse region based on the reuse
9 region instance information.
 - 1 2. The method of claim 1 wherein determining whether the reuse region
2 instance information contains a data output comprises:
3 determining whether the data input to the reuse region matches any input
4 information within the reuse region instance information; and
5 when the data input matches input information within the plurality of
6 instances, determining whether the reuse region is identified by a normal reuse
7 instruction..

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1 3. The method of claim 1 wherein the reuse region instance information
2 includes input information and output information for each instance of the reuse
3 region.

1 4. The method of claim 3 wherein the reuse region instance information
2 further includes a plurality of confidence counters for each live-out register of the
3 reuse region, each of the plurality of confidence counters being associated with a
4 certain prediction technique.

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1 5. The method of claim 1 wherein predicting the data output further
2 comprises: predicting a current set of live-out registers of the reuse
3 region; and
4 predicting an output value for each live-out register within the current set
5 of live-out registers using at least one prediction technique and a prediction list
6 maintained in the buffer.

1 6. The method of claim 5 wherein predicting an output value for each live-
2 out register further comprises selecting the at least one prediction technique from
3 multiple prediction techniques based upon a plurality of confidence counters
4 associated with the live-out register, each of the plurality of confidence counters
5 corresponding to a certain prediction technique.

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1 7. The method of claim 6 wherein multiple prediction techniques comprise a
2 context-based prediction technique, a stride prediction technique, and a last
3 value prediction technique.

1 8. An apparatus comprising:
2 a buffer to hold reuse region instance information pertaining to a plurality
3 of instances of a reuse region; and
4 a processing core to predict a data output of the reuse region based on the
5 reuse region instance information, and to speculatively execute instructions
6 using the predicted data output of the reuse region.

1 9. The apparatus of claim 8 wherein the processing core is configured to
2 determine whether a data output of the reuse region is to be predicted.

1 10. The apparatus of claim 9 wherein the processing core is further configured
2 to search the buffer for a matching instance and to determine whether the reuse
3 region is identified by a normal reuse instruction

1 11. The apparatus of claim 8 wherein the reuse region instance information
2 includes input information and output information for each instance of the reuse
3 region.

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1 12. The apparatus of claim 11 wherein the reuse region instance information
2 further includes a plurality of confidence counters for each live-out register of the
3 reuse region, each of the plurality of confidence counters being associated with a
4 certain prediction technique.

1 13. The apparatus of claim 8 wherein the buffer includes a prediction list
2 having a plurality of pointers to reuse region instances held in the buffer, a
3 pointer to the most currently used instance being located on the top of the
4 prediction list and a pointer to the least currently used instance being located at
5 the bottom of the prediction list.

1 14. The apparatus of claim 8 wherein the buffer includes a value prediction
2 table having an entry that includes a predicted output value, the predicted
3 output value being located using an index.

1 15. The apparatus of claim 8 wherein the processing core is further configured
2 to predict a current set of live-out registers of the reuse region, and to predict an
3 output value for each live-out register within the current set of live-out registers
4 using at least one prediction technique and a prediction list maintained in the
5 buffer.

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1 16. The apparatus of claim 15 wherein the at least one prediction technique is
2 selected from multiple prediction techniques based upon a plurality of
3 confidence counters associated with the live-out register, each of the plurality of
4 confidence counters corresponding to a certain prediction technique.

1 17. The apparatus of claim 16 wherein multiple prediction techniques
2 comprise a context-based prediction technique, a stride prediction technique, and
3 a last value prediction technique and wherein the prediction list points to
4 the most recently used instance when the last value prediction technique
5 is used,
6 two most recently used instances when the stride prediction technique is
7 used, and
8 instances associated with a corresponding live-out register when the
9 context-based prediction technique is used, the associated instances being used
10 to calculate an index pointing to a predicted output value in a value prediction
11 table maintained in the buffer.

1 18. A system comprising:
2 a memory to store regions of code; and
3 a processor, coupled to the memory, to identify a reuse region in the
4 regions of code, to determine whether a data output of the reuse region is
5 contained within reuse region instance information pertaining to a plurality of

6 instances of the reuse region, and when the data output is not contained within
7 the reuse region instance information, to predict the data output of the reuse
8 region based on the reuse region instance information.

1 19. The system of claim 18 wherein the processor comprises a buffer to store
2 the reuse region instance information.

1 20. The system of claim 19 wherein the reuse region instance information
2 includes input information and output information for each instance of the reuse
3 region.

1 21. The system of claim 19 wherein the reuse region instance information
2 includes a plurality of confidence counters for each live-out register of the reuse
3 region, each of the plurality of confidence counters being associated with a
4 certain prediction technique.

1 22. The system of claim 19 wherein the buffer includes a prediction list having
2 a plurality of pointers to reuse region instances held in the buffer.

1 23. The system of claim 19 wherein the buffer includes a value prediction
2 table having an entry that includes a predicted output value, the predicted
3 output value being located using an index.

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1 24. A computer readable medium comprising instructions, which when
2 executed on a processor, perform a method for speculatively reusing regions of
3 code, the method comprising:
4 identifying a reuse region and a data input to the reuse region;
5 determining whether a data output of the reuse region is contained within
6 reuse region instance information pertaining to a plurality of instances of the
7 reuse region; and
8 when the data output is not contained within the reuse region instance
9 information, predicting the data output of the reuse region based on the reuse
10 region instance information.

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1 25. The computer readable medium of claim 24 wherein determining whether
2 the reuse region instance information contains a data output comprises:
3 determining whether the data input to the reuse region matches any input
4 information within the reuse region instance information; and
5 when the data input matches input information within the plurality of
6 instances, determining whether the reuse region is identified by a normal reuse
7 instruction.

1 26. The computer readable medium of claim 24 wherein the reuse region
2 instance information includes input information and output information for each
3 instance of the reuse region.

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1 27. The computer readable medium of claim 26 wherein the reuse region
2 instance information further includes a plurality of confidence counters for each
3 live-out register of the reuse region, each of the plurality of confidence counters
4 being associated with a certain prediction technique.

1 28. The computer readable medium of claim 24 wherein predicting the data
2 output further comprises:
3 predicting a current set of live-out registers of the reuse region; and
4 predicting an output value for each live-out register within the current set
5 of live-out registers using at least one prediction technique and a prediction list
6 maintained in the buffer.

1 29. The computer readable medium of claim 28 wherein predicting an output
2 value for each live-out register further comprises selecting the at least one
3 prediction technique from multiple prediction techniques based upon a plurality
4 of confidence counters associated with the live-out register, each of the plurality
5 of confidence counters corresponding to a certain prediction technique.

1 30. The computer readable medium of claim 29 wherein multiple prediction
2 techniques comprise a context-based prediction technique, a stride prediction
3 technique, and a last value prediction technique.